

WHAT IS CLAIMED IS:

1. In an apparatus comprising a dividing wall distillation column, the column having a shell defining a middle vapor-liquid contacting area containing at least one vertically oriented partition dividing the middle vapor-liquid contacting area into at least a feed section defined by the shell and the partition and a sidedraw section defined by the shell and the partition, an upper vapor-liquid contacting area being above and in communication with the middle vapor-liquid contacting area, and a lower vapor-liquid contacting area being below and in communication with the middle vapor-liquid contacting area, the column having a first inlet port in communication with the upper vapor-liquid contacting area, a second inlet port in communication with the feed section, and a first outlet port in communication with the sidedraw section, the improvement comprising
  - a) a first temperature measuring device operably connected to the column to measure temperature in the column and to establish a first temperature signal representative of temperature in the column, wherein the first temperature measuring device is vertically spaced above the first outlet port;
  - b) a first controller to receive a first controller input signal responsive to the first temperature signal, to compare the first controller input signal to a first set point, and to establish a first controller output signal responsive to the difference between the first controller input signal and the first set point;
  - c) a first means for adjusting temperature in the column, the first means for adjusting temperature in the column being responsive to the first controller output signal;
  - d) a second temperature measuring device operably connected to the column to measure temperature in the column and to establish a second temperature signal representative of temperature in the column, wherein

the second temperature measuring device is vertically spaced below the first outlet port;

- e) a second controller to receive a second controller input signal responsive to the second temperature signal, to compare the second controller input signal to a second set point, and to establish a second controller output signal responsive to the difference between the second controller input signal and the second set point; and
  - f) a second means for adjusting temperature in the column, the second means being responsive to the second controller output signal.
2. The apparatus of claim 1 wherein the first means for adjusting temperature comprises a means for adjusting heat input to or heat removal from the column.
3. The apparatus of claim 1 wherein the upper vapor-liquid contacting area is in communication with a condenser to condense vapor from the upper vapor-liquid contacting area to liquid, the column has a third inlet port in communication with the condenser to introduce liquid to the upper vapor-liquid contacting area, and the first means for adjusting temperature comprises a valve in communication with the condenser and with the third inlet port, the valve operably located to control the flow of liquid from the condenser to the upper vapor-liquid contacting area.
4. The apparatus of claim 1 wherein the upper vapor-liquid contacting area is in communication with a contact condenser to condense vapor from the upper vapor-liquid contacting area to liquid and to introduce liquid to the upper vapor-liquid contacting area, and the first means for adjusting temperature comprises a valve operably located to control the flow of a heat transfer medium to the contact condenser.
5. The apparatus of claim 1 wherein the column has a third inlet port in communication with the middle vapor-liquid contacting area, and the second means for adjusting temperature comprises a valve in communication with the

third inlet port, the valve operably located to control the flow of liquid to the middle vapor-liquid contacting area.

6. The apparatus of claim 1 wherein the second temperature signal is representative of temperature in the lower vapor-liquid contacting area and the valve is operably located to control the flow of liquid to the sidedraw section.
7. The apparatus of claim 1 wherein the column has a second outlet port in communication with the lower vapor-liquid contacting area to withdraw liquid from the lower vapor-liquid contacting area and a third inlet port in communication with the lower vapor-liquid contacting area to introduce vapor to the lower vapor-liquid contacting area, the third inlet port being in communication with a reboiler to vaporize liquid from the lower vapor-liquid contacting area to vapor, and the second means for adjusting temperature comprises a valve in communication with the second outlet port and the reboiler, the valve operably located to control the flow of liquid from the lower vapor-liquid contacting area to the reboiler.
8. The apparatus of claim 1 wherein the lower vapor-liquid contacting area is in communication with a reboiler to vaporize liquid from the lower vapor-liquid contacting area to vapor and to introduce vapor to the lower vapor-liquid contacting area, and the second means for adjusting temperature comprises a valve operably located to control the flow of a heat transfer medium to the reboiler.
9. The apparatus of claim 1 further characterized in that the operable connection of the first temperature measuring device to the column comprises an operable connection of the first temperature measuring device to at least one region selected from the group consisting of the upper vapor-liquid contacting area, the feed section, and the sidedraw section.
10. The apparatus of claim 1 further characterized in that the operable connection of the second temperature measuring device to the column comprises an operable connection of the second temperature measuring device to at least one

region selected from the group consisting of the lower vapor-liquid contacting area, the feed section, and the sidedraw section.

11. The apparatus of claim 1 wherein the first controller input signal is the first temperature signal.
- 5 12. The apparatus of claim 1 wherein the second controller input signal is the second temperature signal.
13. The apparatus of claim 1 further comprising a third temperature measuring device operably connected to the column to measure temperature in the column and to establish a third temperature signal representative of temperature in the column, wherein the third temperature measuring device is vertically spaced  
10 above the first outlet port, a combiner to receive a first combiner input signal responsive to the first temperature signal, to receive a second combiner input signal responsive to the third temperature signal, to combine the first combiner input signal and the second combiner input signal and to establish the first  
15 controller input signal, the first controller input signal being responsive to the second combiner input signal.
14. The apparatus of claim 13 wherein the first combiner input signal is the first temperature signal and the second combiner input signal is the third temperature signal.
- 20 15. The apparatus of claim 13 wherein the combiner comprises a summer to sum the first combiner input signal and the second combiner input signal, the first controller input signal being responsive to the sum of the first combiner input signal and the second combiner input signal.
16. The apparatus of claim 13 further comprising a weighting device to provide  
25 gain or bias to the first temperature signal to establish the first combiner input signal.
17. The apparatus of claim 16 wherein the weighting device comprises a first multiplier to multiply the first temperature signal by a first scalar to establish

the first combiner input signal, the first combiner input signal being responsive to the product of the first temperature signal and the first scalar.

18. The apparatus of claim 17 further comprising a second multiplier to multiply the third temperature signal by a second scalar to establish the second combiner input signal, the second combiner input signal being responsive to the product of the third temperature signal and the second scalar.
19. The apparatus of claim 1 further characterized in that the operable connection of the first temperature measuring device to the column comprises an operable connection of the first temperature measuring device to at least one first region selected from the group consisting of the upper vapor-liquid contacting area, the feed section, and the sidedraw section, and that the operable connection of the second temperature measuring device to the column comprises an operable connection of the second temperature measuring device to at least one second region selected from the group consisting of the feed section, the sidedraw section, and the lower vapor-liquid contacting area..
20. The apparatus of claim 19 wherein the at least one first region comprises the upper vapor-liquid contacting area and the at least one second region comprises the lower vapor-liquid contacting area or the sidedraw section.
21. An apparatus comprising
- a) a distillation column having a shell defining a middle vapor-liquid contacting area, an upper vapor-liquid contacting area above and in communication with the middle vapor-liquid contacting area, and a lower vapor-liquid contacting area below and in communication with the middle vapor-liquid contacting area;
  - b) at least one vertically oriented partition dividing the middle vapor-liquid contacting area into at least a feed section defined by the shell and the partition and a sidedraw section defined by the shell and the partition;
  - c) a first inlet port in communication with the upper vapor-liquid contacting area;

- d) a second inlet port in communication with the feed section;
  - e) a first outlet port in communication with the sidedraw section;
  - f) a first temperature measuring device operably connected to the column to measure temperature in the column and to establish a first temperature signal representative of temperature in the column, wherein the first temperature measuring device is vertically spaced above the first outlet port;
  - g) a first controller to receive a first controller input signal responsive to the first temperature signal, to compare the first controller input signal to a first set point, and to establish a first controller output signal responsive to the difference between the first controller input signal and the first set point;
  - h) a first means for adjusting temperature in the column, the means being responsive to the first controller output signal;
  - i) a second temperature measuring device operably connected to the column to measure temperature in the column and to establish a second temperature signal representative of temperature in the column, wherein the second temperature measuring device is vertically spaced below the first outlet port;
  - j) a second controller to receive a second controller input signal responsive to the second temperature signal, to compare the second controller input signal to a second set point, and to establish a second controller output signal responsive to the difference between the second controller input signal and the second set point; and
  - k) a second means for adjusting temperature in the column, the second means being responsive to the second controller output signal.
22. In an apparatus comprising a dividing wall distillation column, the column having a shell defining a middle vapor-liquid contacting area containing at least one vertically oriented partition dividing the middle vapor-liquid

- contacting area into at least a feed section defined by the shell and the partition and a sidedraw section defined by the shell and the partition, an upper vapor-liquid contacting area being above and in communication with the middle vapor-liquid contacting area, and a lower vapor-liquid contacting area being below and in communication with the middle vapor-liquid contacting area, the column having a first inlet port in communication with the upper vapor-liquid contacting area, a second inlet port in communication with the feed section, and a first outlet port in communication with the sidedraw section, the improvement comprising
- 10 a) a first temperature measuring device operably connected to the column to measure temperature in the column and to establish a first temperature signal representative of temperature in the column, wherein the first temperature measuring device is vertically spaced above the first outlet port;
  - 15 b) a first controller to receive a first controller input signal responsive to the first temperature signal, to compare the first controller input signal to a first set point, and to establish a first controller output signal responsive to the difference between the first controller input signal and the first set point; and
  - 20 c) a first means for adjusting temperature in the column, the means being responsive to the first controller output signal, wherein the upper vapor-liquid contacting area is in communication with a contact condenser and the first means for adjusting temperature comprises a valve operably located to control the flow of a cooling medium to the contact condenser.
- 25 23. An apparatus comprising
- a) a distillation column having a shell defining a middle vapor-liquid contacting area, an upper vapor-liquid contacting area above and in communication with the middle vapor-liquid contacting area, and a

lower vapor-liquid contacting area below and in communication with the middle vapor-liquid contacting area;

- 5           b) at least one vertically oriented partition dividing the middle vapor-liquid contacting area into at least a feed section defined by the shell and the partition and a sidedraw section defined by the shell and the partition;
- c) a first inlet port in communication with the upper vapor-liquid contacting area;
- d) a second inlet port in communication with the feed section;
- e) a first outlet port in communication with the sidedraw section;
- 10          f) a first temperature measuring device operably connected to the column to measure temperature in the column and to establish a first temperature signal representative of temperature in the column, wherein the first temperature measuring device is vertically spaced above the first outlet port;
- 15          g) a first controller to receive a first controller input signal responsive to the first temperature signal, to compare the first controller input signal to a first set point, and to establish a first controller output signal responsive to the difference between the first controller input signal and the first set point; and
- 20          h) a first means for adjusting temperature in the column, the means being responsive to the first controller output signal, wherein the upper vapor-liquid contacting area is in communication with a contact condenser, and the first means for adjusting temperature comprises a valve operably located to control the flow of a cooling medium to the contact condenser.

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